CLAIMS

1. A method for non-invasive detection of a vagus nerve stimulation signal, the method comprising the following steps:

applying electrodes to a patient in proximity to an implanted vagus nerve stimulator;

detecting a vagus nerve stimulation pulse applied by the stimulator to the patient;

amplifying the detected vagus nerve stimulation pulse;

filtering the detected vagus nerve stimulation signal in a bandwidth selected to eliminate extraneous noise; and

prolonging the detected signal to allow sampling of the vagus nerve stimulation signal for an extended period of time.

2. The method as defined in claim 1, further comprising the step of comparing the detected vagus nerve signal to a threshold level prior to elongating the vagus nerve signal.

3. The method as defined in claim 1, further comprising the step of electrically isolating the amplified input signal.

4. The method as defined in claim 1, further comprising the step of rectifying the filtered signal.

5. The method as defined in claim 1, further comprising the step of producing an alarm signal providing at least one of a visual or an audio signal to a user indicating that the vagus nerve signal has been detected.

6. A non-invasive vagus nerve signal detection apparatus, comprising:

an electrode adapted to be coupled to a patient having an implanted vagus nerve simulator for detecting a differential signal indicative of a pulse applied to the vagus nerve;

an amplifier for amplifying the detected vagus nerve signal;

a filter for filtering the detected vagus nerve signal from other signals;

a rectifier for rectifying the detected signal; and

a comparator for comparing the rectified signal to a threshold level and for providing an output signal at a predetermined value for a predetermined minimum time.

7. The vagus nerve signal detection apparatus as defined in claim 6, further comprising a second amplifier for amplifying the filtered vagus nerve signal.

8. The vagus nerve signal detection apparatus as defined in claim 6, wherein the comparator comprises a Schmitt trigger.

9. The vagus nerve signal detection apparatus as defined in claim 6, wherein the filter is a passband filter having a range of five to ten kilohertz.

10. The vagus nerve signal detection apparatus as defined in claim 6 wherein the filter is a passband filter having a range of one hertz to twenty kilohertz.

11. The vagus nerve signal detection apparatus as defined in claim 6, wherein the amplifier has a gain of substantially two hundred.

12. The vagus nerve signal detection apparatus as defined in claim 6, further comprising an alarm circuit producing at least one of an audio or a visual indicator for a user.

13. A method for long-term, non-invasive monitoring of a vagus nerve stimulation signal, the method comprising the following steps:

applying electrodes to a patient in proximity to an implanted vagus nerve stimulator device to detect a vagus nerve stimulation signal;

amplifying the detected vagus nerve stimulation signal;

filtering the detected vagus nerve stimulation signal in a bandwidth selected to eliminate extraneous noise and providing a real time vagus nerve signal;

comparing the real time vagus nerve signal to a predetermined threshold signal level and retaining the signal at a predetermined output signal level for a period of time selected to provide a prolonged vagus nerve stimulation signal allowing sampling at a lower rate than the real time vagus nerve signal; and

using the prolonged vagus nerve stimulation signal to trigger sampling of at least one other physiological signal, wherein the effect of the vagus nerve stimulation on the at least one other physiological signal is monitored.

14. The method as defined in claim 13, further comprising the step of detecting an analog signal representative of at least one of an electrocardiogram (ECG), an electroencephalogram (EEG), a blood pressure measurement, and a breathing measurement.

15. The method as defined in claim 14, further comprising the step of electrically connecting each of the vagus nerve signal and the physiological signal to a controller, the controller being programmed to monitor the physiological signal as a function of the vagus nerve signal.

16. The method as defined in claim 15, further comprising the step of storing at least one of the real and the prolonged vagus nerve signal and the physiological signal as a function of time.

17. The method as defined in claim 15, further comprising the step of displaying the at least one of the real time and the prolonged vagus nerve signal and the physiological signal on a display as a function of time.

18. The method as defined in claim 17, further comprising the step of providing at least one of a visual and an audio output when the prolonged vagus nerve signal is detected.

19. The method as defined in claim 13, further comprising the step of isolating the detected vagus nerve signal from the real time vagus nerve signal and the prolonged vagus nerve signal.

20. The method as defined in claim 17, further comprising the step of rectifying the real time vagus nerve signal prior to the step of comparing the real time vagus nerve signal to the threshold value.